

Claims

1. A membrane for removing proteases from a fluid, comprising a functionalized microporous membrane body containing functional groups capable of chemically coupling with protease inhibitors and at least one protease inhibitor capable of selectively binding proteases, wherein said at least one protease inhibitor is coupled to said membrane body via said functional groups.

2. The membrane of claim 1 wherein said protease inhibitor is capable of binding with acidic proteases.

3. The membrane of claim 2 wherein said protease inhibitor is pepstatin.

4. The membrane of claim 1 wherein said protease inhibitor is capable of binding with metalloproteases.

5. The membrane of claim 4 wherein said protease inhibitor is selected from the group consisting of bestatin, diproten and EDTA.

6. The membrane of claim 1 wherein said protease inhibitor is capable of binding with cysteine proteases.

7. The membrane of claim 6 wherein said protease inhibitor is selected from the group consisting of antipain, chymostatin, leupeptin and E64.

8. The membrane of claim 1 wherein said protease inhibitor is capable of binding with serine proteases.

9. The membrane of claim 8 wherein said protease inhibitor is selected from the group consisting of TLCK and p-aminobenzamidine.

10. The membrane of any of claims 1-10 wherein said microporous membrane body contains two different protease inhibitors.

11. A device for removing proteases from biological fluids and pharmaceutical solutions comprising a housing having a fluid inlet and a fluid outlet, said housing containing four membrane bodies arranged therein in series, wherein said membrane bodies each comprise a functionalized microporous membrane body containing functional groups capable of chemically coupling with protease inhibitors and at least one protease inhibitor capable of selectively binding with proteases, wherein said at least one protease inhibitor is coupled to said membrane body via said functional groups.

12. The device of claim 11 wherein said membrane bodies each contain a different protease inhibitor capable of binding with a protease selected from the group consisting of an acidic protease, a metalloprotease, a cysteine protease and a serine protease.

5 13. The device of claim 12 wherein said protease inhibitor capable of binding with an acidic protease is pepstatin; said protease inhibitor capable of binding with a metalloprotease is selected from the group consisting of bestatin, diprotin and EDTA; said protease inhibitor capable of binding with a cysteine protease is selected from the group consisting of antipain, chymostatin, leupeptin and E64; and said protease inhibitor capable of binding with a serine protease is selected from the group consisting of TLCK and p-aminobenzamidine.
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14. The device of claim 11 wherein said membrane bodies each contain two different protease inhibitors.

15. A method for removing proteases from fluids comprising feeding a protease-containing fluid to the device of any of claims 11-14.